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Kingshill

POWER SUPPLIES

TECHNICAL DATA

'K' SERIES

KINGSHILL ELECTRONIC PRODUCTS LTD., TORRENS STREET, LONDON, EC1. 01-837 9865

TECHNICAL DATA

CIRCUIT DESCRIPTION

The various models have basically the same circuit in which the secondary taps on the transformer T1 are adjusted such that a suitable unregulated voltage appears across C2 via the rectifier bridge MR2.

The unregulated voltage is fed to the series control element VT1, the conduction of which is automatically adjusted to maintain a constant output voltage, by the thick-film error amplifier.

This amplifier compares the voltage from the reference zener diode MR1, to a fraction of the output voltage obtained from the potential divider chain using R8 and RV2, then applies an amplified error signal to VT1 in such a direction as to reduce the error.

The output capacitor C5 provides some degree of energy storage to minimise transients, when load current step changes occur and C1 together with C5, control the overall stability of the amplifiers feed-back loop.

The output voltage is adjusted by RV2 and changing R8 if necessary on the 15-30 volt units.

For units below 7 volts a 3V zener MR1 provides the reference voltage, R2 is 390 ohms and R3 omitted. However, above 7V a 6.2V reference element with a low temperature coefficient is used, R2 is omitted and R3 becomes 330 ohms. The 15-30 volt units can be converted to 7-15V by changing R5, R7, and R8 to the values given for the 7-15 volt range.

The current limit which is of the re-entrant self resetting type, is adjusted by RV1.

MAINS VOLTAGE SETTINGS.

Main connections to all standard modules are marked at the bottom of the front panel barrier strip as L.N.E. and the primary tappings on the mains transformer must be set to correspond with the user's mains voltage. These tappings are connected to clearly marked turret lugs on the mains transformer panel, a soldering iron being necessary if a change is required. Units are set at 240V on despatch unless otherwise specified.

Most modules have twin transformer primaries of 5, 0, 100, 110, 120 volts for series or parallel connection, giving 100 to 125 and 200 to 250 volts in 5 volt increments. The $5\frac{1}{8}$" x 4" x $7\frac{1}{2}$" units are normally supplied with a twin primary of 0, 110, 120 volts, (to provide for 110 volts or 240 volts input) but a single primary of 10, 0, 200, 220, 240 volts is available on request. A single primary of 5, 0. 100, 110. 120 volts can be supplied to special order.

PRESET OUTPUT VOLTAGE

The voltage to which the unit has been preset is indicated by an adhesive label on the front panel. The set volts potentiometer RV2 is mounted on the P.C.B.

ALTERATION OF OUTPUT VOLTAGE

The output voltage of a supply may be altered to any voltage between the minimum and the maximum by making at most 4 changes. These are:–

(a) The value of R8 to set the required voltage within the swing of the set volts control RV2 (see table)

(b) The value of R5 to set the current limiter coverage (RV1 preset) (see table)

(c) The correct mains transformer secondary tappings to suit the new output voltage. (See formula overleaf.)

Failure to observe this requirement may result in the unit not stabilising, or its series transistors being overrun and possibly damaged.

(d) The value of R7 (see table)

ALTERATION OF CURRENT LIMITER

The current limiter is adjusted by RV1, a preset linear potentiometer, which is located on the component printed circuit board of all units. The limiter may be set to operate at load currents down to about 20% of the maximum rating of the unit.

MOUNTING AND VENTILATION

Standard modules are restricted to mounting positions in which the main heatsinks are in a vertical plane. The brackets supplied with each unit allow mounting to be effected from any of its faces. Adequate ventilation must be allowed, and the ambient temperature of cooling air inside the unit must not exceed that specified.

NOTE.

Standard modules may be mounted with heat sinks horizontal provided that a suitable unit derating is applied. The derating will necessarily depend upon the type of unit and the circumstances in which it is used.

SERIES OPERATION.

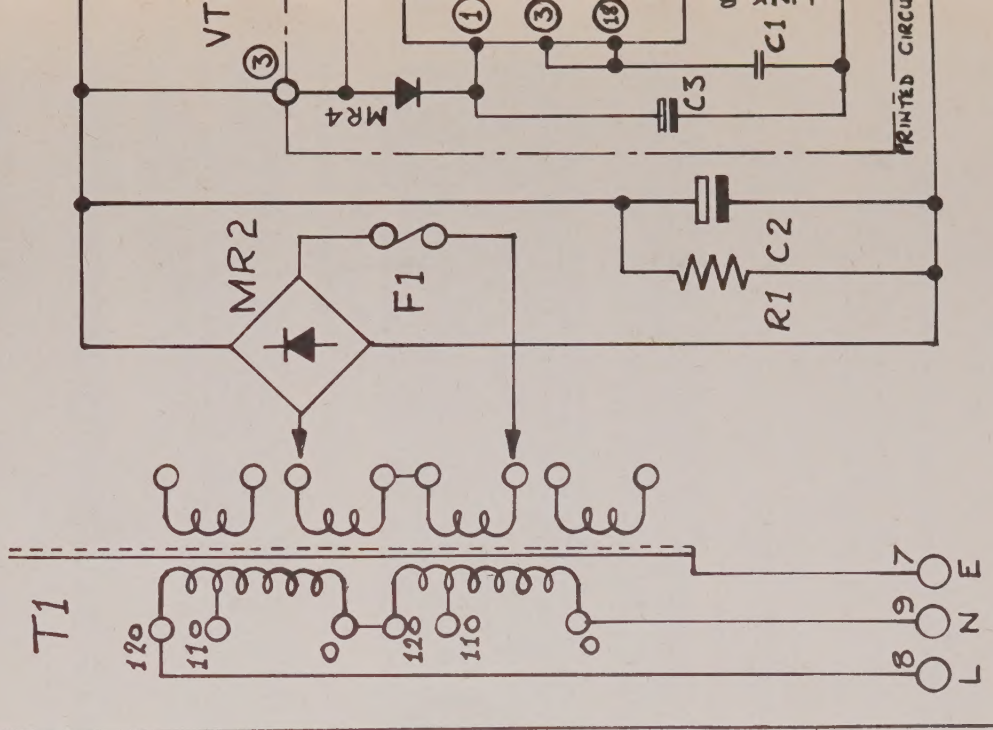
The units may be used in series so long as no point in the circuit is more than 500 volts above earth. The units are supplied with a reverse diode capable of taking its own short-circuit current however, if e.g. a 2 amp unit and a 10 amp unit are used in series and the output short-circuited the diode across one supply acts as a current path for the short circuit current of the other supply. Therefore, if two different units are used a larger reverse diode may be needed across the smaller unit.

OPERATION IN PARALLEL.

Any units may be used together.

All positive outputs should be joined together at one end of the load and all negative outputs should be joined together at the other end of the load. If the various output voltages differ drastically (by more than the regulation voltage change for the units), the unit with the highest setting will effectively deliver all the load current demand until its maximum current rating is reached. Until this occurs, the other units will be prevented from delivering any current, since from their point of view the output voltage is too high (although perhaps by only a few millivolts). Which results in a turn-off signal being applied in their series elements. As the load demand increases, the first unit eventually current limits and its terminal voltage falls until the set voltage of the unit with the second highest output voltage is reached. The second unit then delivers load current together with the first unit until an increase in load causes limiting to occur in the second unit. A further small voltage drop then occurs before the next unit delivers its share of the load current.

If the various output voltages are set so that their difference is less than the regulation of the units then generally all units will deliver some current to any load, but they may not necessarily current share. However, regardless of the voltage setting used the total change in output voltage from no load to full load (i.e. some of all unit current ratings) will be from the voltage of the highest set unit to the full terminal voltage of the lowest set unit.



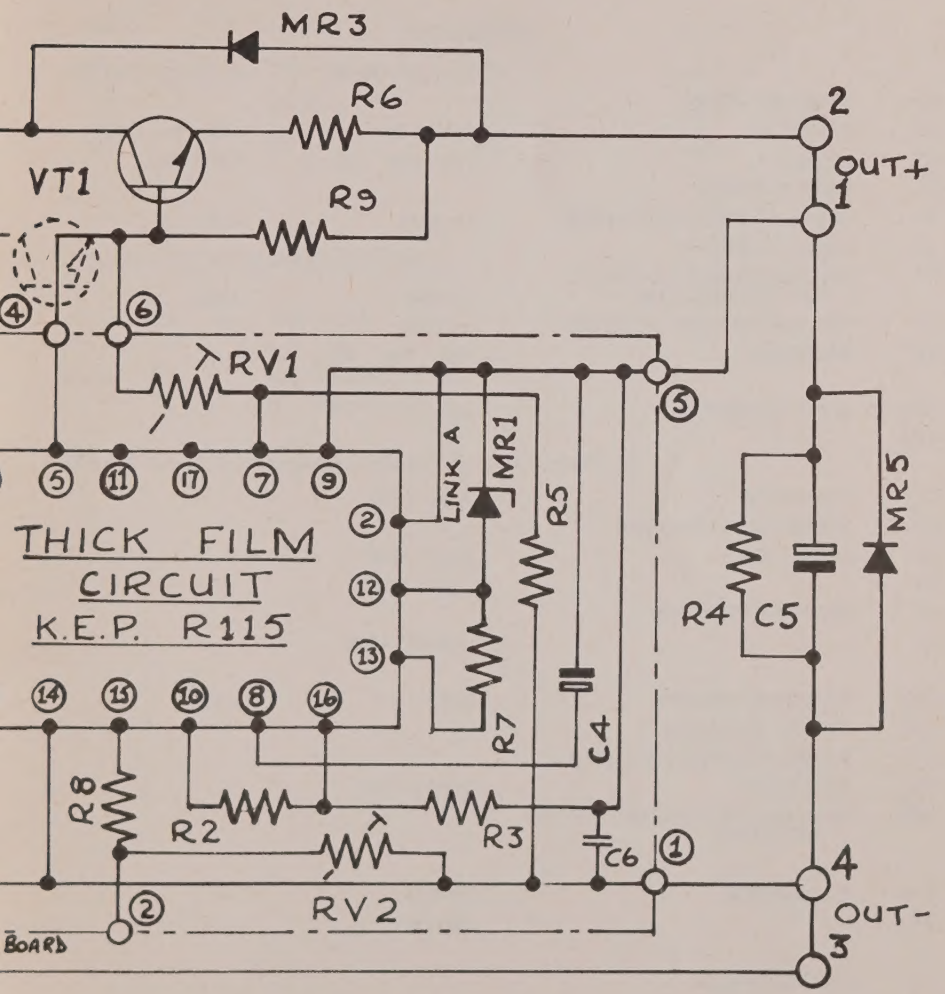
VT2 Fitted on units above 1 amp.

ISSUE	
MOD	

KINGSHILL ELECTRONIC PRODUCTS LTD. TORRENS WORKS, TORRENS STREET LONDON E.C.1.

DRAWN B.J.R.	TITLE CIRCUIT DIAGRAM 'K' UNITS	DRG. No. AKIC 1598
DATE 12.6.73		
APPROVED		

R.D.O.


MR3
R6
VT1
R9
2
OUT+
1
RV1
LINK A
MR1
R5
MR5
R4
C5
THICK FILM
CIRCUIT
K.E.P. R115
R7
C4
R8
R2
R3
C6
RV2
4
OUT-
3
BOARD

PARTS LIST

	DESCRIPTION	7V AND ABOVE	5V (IF DIFFERENT)
R1	BLEED RESISTOR		
R2	RESISTOR	OMITTED	390 ½w 2%
R3	RESISTOR	330 ½w 2%	OMITTED
R4	LOAD RESISTOR		
R5	CURRENT SETTING RESISTOR	see table	2.2K " "
R6	SERIES RESISTOR		
R7	REFERENCE DIODE CURRENT SETTING RESISTOR	see table	LINK
R8	VOLTAGE SETTING RESISTOR	see table	47 " "
R9	RESISTOR	100 ½w 2%	
RV1	POTIENTIOMETER	1K	
RV2	"	"	
C1	CAPACITOR	0.1μ 400V	
C2	RESERVOIR CAPACITOR		
C3	CAPACITOR	22μF 64V	
C4	"	100μF 12V	
C5	OUTPUT CAPACITOR		
C6	" "	0.047μF 400V	
MR1	REFERENCE ZENER	IN823	LR30
MR2	BRIDGE RECTIFIER		
MR3	VT1 PROTECTION RECTIFIER		
MR4	RECTIFIER	10D2 or SD2	
MR5	REVERSE VOLTAGE PROTECTION RECTIFIER		
VT1	TRANSISTOR	2N3055	
VT2	"	2N5296	
T1	TRANSFORMER		

SETTING UP VALUES OF RESISTANCES FOR K UNITS

ITEM	7–15V	15–22	22–30
R5	5.6K	10K	10K
R7	LINK	2.2K	2.2K
R8	47	820	1.5K

GUIDE TO A.C. SECONDARY TAPS ON IT

$$Vt = 0.9V + 5Vo$$

where Vt = A.C. Secondary Volts
Vo = D.C. Output Volts

NOTE: The A.C. may require final adjustment to meet specification.

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